AMERICAN ANNALS OF THE DEAF

FOUNDED 1847

Official Organ

Conference of Executives of American Schools for the Deaf

FOUNDED 1868

Convention of American Instructors of the Deaf

FOUNDED 1850

POWRIE V. DOCTOR
Editor

LEONARD M. ELSTAD
Associate Editor

Under the Direction of the Executive Committee of the Conference

CLARENCE D. O'CONNOR	New York, 1955
MARVIN B. CLATTERBUCK	Oregon, 1955
J. G. DEMEZA	Ontario, 1956
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A. S. MYKLEBUST	South Dakota, 1957
NATHAN P. HARRIS	Massachusetts, 1957
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THE CONFERENCE OF EXECUTIVES OF AMERICAN SCHOOLS FOR THE DEAF, originally the Conference of Superintendents and Principals of American Schools for the Deaf, was founded in 1868 and subsequently incorporated under the laws of the State of Maryland in 1931. The Conference is an organization of the executive heads of schools for the deaf in the United States and Canada, and has for its object "to promote the management and operation of schools for the deaf along the broadest and most effective lines and to further and promote the general welfare of the deaf."

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THE CONVENTION OF AMERICAN INSTRUCTORS OF THE DEAF, founded in 1850 and incorporated by act of Congress in 1897, is an organization of educators of the deaf in the United States and Canada with the general object of "promotion of the education of the deaf on the broadest, most advanced, and practical lines," and for that purpose "to secure the harmonious union in the organization, of all persons actually engaged in educating the deaf in America."

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Some Aspects of School Placement of Young Deaf Children*

NATHAN P. HARRIS, M.ED.
Principal, Horace Mann School, Roxbury, Mass.

FORTUNATELY the education of handicapped children is receiving more attention today than ever before. We who are specifically interested in the deaf and the hard of hearing are aware of the growth and expansion of the many auxiliary centers that are endeavoring to help these children. Clinics and hospitals have undertaken research that does not stop at the therapeutical stage, "but go on to recommend educational practices and placement as well."

In speaking of this situation, we are in no way at odds with the medical profession. There is no axe to grind, certainly no professional jealousy, but only the mutual feeling that everything possible should and must be done to reduce the handicaps of the deaf and the hard of hearing.

Thinking in terms of the whole child, the medical details are as important as the educational and social aspects of his well being. However, a question may exist as to whether or not a deaf child having been given medical treatment and advice, should also be given educational placement by the doctors without consulting with those who are the experts in the education of the deaf. Many medical men who may attempt to give educational advice as to placement of deaf children have never visited a school for the deaf and are not acquainted with their special educational needs. I was in attendance at a convention of doctors and surgeons during a session on the deaf and the hard of hearing, and a majority of them said they did not know of any sources that were capable of giving authentic information on the educational problems of the deaf.

* Address delivered at the meeting of The Conference of Executives of American Schools for the Deaf, Santa Fe, New Mexico, April 21, 1954.

I told them of the *American Annals of the Deaf* and of the Volta Bureau and they were thankful for this information.

In many cases, a doctor has said to a parent of a deaf child, "Oh, he will be able to go to a regular public school."

This points to the need of doctors and educators combining their knowledge in the problem of school placement of young deaf children.

We fully recognize the work that auxiliary centers are trying to do and certainly the ideal of placing all atypical children in a normal atmosphere, particularly in the public school classroom, is one worthy of all our efforts.

However, every person versed in the knowledge of and experience in the field of the education of the deaf, will not submit to the idea that deaf children, who lack speech and language, should be placed in schools for the hearing with a hearing aid and be expected to learn in a normal fashion.

We should also consider the environment where teaching is to go on. Auxiliary centers are not as a rule laid out properly. Usually some space is allocated for this project and the personnel get along as well as possible.

In contrast to this, a well graded school for the deaf can take care of this special work. It is an integral unit and provides for the education of the whole child, not just in special areas. Children in such schools have all the advantages of their brothers and sisters in the schools for the hearing, the same incentive and the same competition. They are given an opportunity to taste immediate success.

We should also understand that schools for the deaf do not swallow up those that enter their portals. Parents have told me that they were informed that "once you sign up your child in a school for the deaf, you will never get him out."

In general, it can be said, that schools for the deaf can provide a much better program for young deaf and some hard of hearing children than the various auxiliary groups.

A complete curriculum can be provided by schools of this type that will lead these children into regular grades in our schools where most of these children belong and can receive their greatest educational advantages.

As all teachers of the deaf know, the greatest need of young children with profound hearing losses, is to establish

communication skills, and ability to use language in all its forms. Auxiliary programs generally may not have the "know how" or the trained staff to so prepare children with impaired hearing for their educational careers. Furthermore, to move them on from these programs to regular programs for the hearing, works hardship on young deaf children. We should be firm believers in transferring from schools for the deaf to regular classes for the hearing those children who are able to meet the challenge of this program.

Among the factors to be fully evaluated in making this transfer are the language and lipreading ability of the pupil, general use of speech and language, intelligence quotient, emotional stability, and ability of parents to help their children.

The children who fit into this category will generally be those who have some residual hearing that will be of help to them. This means usually those whose hearing loss ranges from 60–85 db in the speech range. Children with greater losses than this might make this transfer under the most favorable circumstances but the number would be very small.

There is no question that the best place for a deaf child to get his total education including nursery school, is in a well organized school for the deaf.

It is said by auxiliary centers that the state pays more to educate a child in a school for the deaf. All specialized instruction costs more. What about the operating costs of many of these auxiliary centers or other clinics? Divide the cost of all factors by the number of pupils you service and you will have a high figure.

Using cost as an argument against placing children in a school for the deaf is wrong. When a child is placed by mistake in a school for the hearing and the child has to repeat grades, that is expensive. When a slow learning child needs much more attention from a teacher in a class of 30 or more, all the other children are being "robbed" of their share of instruction, and that is very expensive. Regardless of how much human beings are admonished to love their fellow men, parents resent having slow children in classes with children who can advance at a much faster

rate. Parents are very cruel about such things and teachers and heads of schools are continually reminded of it. It will be a happy day when education in all its phases receives the proper financial support on City, State, and Federal levels.

In a circular of a clinic, I read that, "We believe that children with hearing difficulties should not be educated with the really deaf child. If the hard of hearing child is sent to a school for the deaf, he may lose the little speech that he has, but with special help, on the other hand, he may be able to keep his place in a public school."

This is a gross mis-statement, and unfair to the children and parents who are given this advice. After many years of experience, I can give you account after account of hard of hearing children who attended schools for the deaf, because this was decided after very careful consideration, and the poor speech that they had was improved. This came about through highly specialized training in speech given them by qualified teachers; through more individual attention with 5 or 6 children in such a class as compared to 30 or more in a public school; and through better integration where the child was not looked upon as being odd.

If we look into the cases of all hard of hearing and deaf children in public schools, who may be fitted with a hearing aid, we find that many are repeating grades. We find on speaking to teachers that "we don't know how to help them," we find that sympathy on the part of the school, and mistaken notions given to parents of young children with profound hearing losses are holding these children in a vise that prevents them from developing educationally.

Dr. Helmer R. Myklebust of Northwestern University says: "there is a promiscuous use of hearing aids on very young children on the assumption that this will take care of their language, speech and academic needs. This is not true. On the basis of clinical experience and research, it is becoming increasingly clear to us that hearing aids must be fitted in a planned, deliberate, cautious manner if they are to be of help to young children, and if they are not to cause emotional difficulties as the child gets older.

"It is our distinct impression that training in socialization and language development are of equal importance,

and in some children with severe hearing impairments perhaps of more importance than the use of amplification in terms of the child's long range adjustment and needs. This does not mean that we are not enthusiastic about the use of amplification, but it means that the use of amplification must be a part of a broader more extensive approach to the child's needs."

We know that there are exceptions and now and then such a handicapped child can make the grade.

No doubt, on many occasions, parents have come to us upset and disillusioned with children 6 to 10 years of age who have honestly tried to hold their place in schools for the hearing and finally have had to seek special methods of education. These parents, having gone from one organization to another, and rightly so, in their endeavor to find help for their children, have been given incorrect advice.

In answer to a common question, "Why didn't you try to enroll your child here before?" the answer has been, "Because I was advised that my child is too young" or "Keep your child at home for six months or a year," or "Don't send him to a school for the deaf."

Many of these children eventually find their way into specialized schools and they get their first opportunity to taste success, their first feeling that they are not an odd lot and their parents come and tell us, "Thank God for such schools."

Much of this misplacement may be avoided, I believe, if doctors, social workers, audiologists and educators, with emphasis on the educators, get together after all the testing is done to decide where the child should be placed.

Doctors are no more qualified to solve educational problems alone than educators are qualified to practice or give medical advice. Much good, however, can come with a closer relationship between the doctor and the educator.

All present here would be most naïve if they did not know that there is a definite competition between auxiliary centers. There is no competition between schools for the deaf. Children are admitted on the basis of their need for attending such a school. If the child does not belong in a school for the deaf, we are pleased to so inform the

parents. Certainly schools for the deaf do not want children who can attend their own neighborhood schools.

Auxiliary centers would be happy to use qualified and trained teachers of the deaf, but they are scarce. These centers recognize the need of highly specialized teachers, but when the children are ready to leave, they do not hesitate to place them in public schools, in the hands of those who unfortunately do not know how to teach them.

Is it possible that the very, very small amount of training given at an auxiliary center can prepare the young deaf child to go to a public school?

Many deaf children are placed in a school with normally hearing children at a tremendous and constant strain. Their work is below par and often they must repeat grades. In many of these cases, competent care can be given only in a school that is set up to handle children with impaired hearing.

We all stress better educational adjustment for school children with hearing disabilities. They should have hearing aids, lipreading instruction, and speech correction as early as possible.

Is the public school, with teachers who know little of hearing aids, if anything at all, or of the techniques involved in teaching lipreading or speech to the deaf, prepared to keep this child as near his normal group as possible?

There will always be "border line cases," situations where there may be a question as to proper placement of a child in school. If you decide to try the schools for the hearing, that is fine, but instead of social workers alone following up their progress, would it not be reasonable to have a person well versed in the education of children with impaired hearing help follow up these cases?

This premise is brought out because in many instances when placement in so called schools for the hearing has not worked out well, the parents have finally, and I quote "taken things in their own hands" and sought advice from schools for the deaf.

We are told that "in most cases profound hearing impairment in children from nerve loss cannot be much improved or restored by any known treatment. In such cases the family should be informed so that valuable time is not wasted in a vain search for a medical miracle."

With very young children, the parent with proper help from teachers, can best help the child in the home. Before the age of 4, the deaf child may benefit greatly by attending a nursery school with normally hearing children. After the age of 4, the child should go to a school specifically for the deaf.

Children with a moderate loss are easily indentified in the classroom because of failure to respond, inattention, poor scholastic record, and faulty articulation. A great number of these no doubt, can be remedied with correct treatment. A correctly fitted hearing aid will be of benefit. The child with poor articulation must have lipreading as insurance against the possibility of his hearing becoming more progressive, and also special speech lessons. With all due respect, the amount of correction done in many public school centers with deaf children needing speech work, is insignificant.

This type of child using a hearing aid and with the ability to read lips may do well in a class of normally hearing children, sitting as close to the teacher as possible and with good lighting facilities.

At best, under these conditions, the child has to learn the hard way. Possibly the grouping of hard of hearing children in graded classes in the public schools, would be an advantage over having them scattered, one here, one there, in different schools. In such a case, a better trained teacher may be obtained and the children would advance at a faster rate.

Multiplicity of agencies in the vicinity, providing services for the acoustically handicapped child, is most confusing to the parents of these children. In many cases it constitutes an additional problem instead of resolving the fundamental problem which confronts the parents. The services available in a few of these agencies are so similar that they practically tend to professional rivalry and competition.

There should be a clearing house for the careful study of doubtful cases with complete facilities for arriving at conclusions in regard to educational placement.

Clinics may have an unusual turnover of trained personnel due to the unattractiveness of economic security involved, inadequate housing, equipment, etc.

By way of contrast, schools for the deaf are built and maintained by generous public and private funds. The buildings are equipped to meet the needs of the deaf child. They have far greater resources, educational as well as financial, on which to depend. Their personnel is encouraged to stay on and grow into the work.

There seems to be an increasing number of deaf children being placed in a school for the hearing situation. The majority of these children are not equipped for it, and suffer undue physical, emotional, and mental pressure because of it.

They are continually forced to compete with hearing children in a crowded classroom guided by a teacher seldom equipped to meet their many special needs.

Many travel great distances to receive supplemental help which is too meagre in terms of time spent to meet their serious communicative inadequacies.

Psychologically, the public school for the hearing situation intensifies the *insecurity* that the deaf child naturally experiences, because he never feels an integral part of the group.

Equally serious, I believe, is the unrealistic attitude it fosters in the parents of these children. We, at schools for the deaf, work hard to get our parents to accept their children and their handicaps, in order to help them constructively. Encouraging the parent to feel that his child has no special problems is unrealistic and most unfair to the child.

Preschool classes for deaf children are gaining rapidly, and in order to discover the feasability of this work, I inquired of experts in this field and submit the questions and answers. 1. What is the philosophy of those engaged in the preschool education of the deaf regarding the placing of these children in regular public schools?

"If education is to be considered in the all-encompassing sense as training for social living, the responsibilities must be viewed with clarity. For the preschool deaf child, the building of skills to enable him to communicate in our world is his greatest need. Due to the nature of deafness, the deaf child develops language far more slowly initially and progressively than does the hearing child. Thus a

deaf child needs teachers who are specialists in the teaching of language. In addition, he needs an environment which considers his limited development in language. Otherwise, he is forced into a situation of impossible competition in language, a fact that at once marks him as different. Special schools provide the best opportunity for the education of the deaf child. Perhaps it need not be added that the preschool years are the most important years for the learning of language."

Note: The term "language" as used here includes speech.

2. What are the advantages and disadvantages of such a preschool program?

"There seems to be no advantage over special education to the preschool deaf child by being placed in regular public schools.

"The disadvantages are many. The few main ones listed here is further emphasis to statements in answer to question 1.

"The richest of experiences and activities are insignificant in the language and mental development of any child unless these activities are described in language. For the preschool deaf child, this means that talking must be done by trained teachers to individual children, or to small groups of children. This is not possible in regular schools.

"Psychologically, the deaf child is in the rôle of a minority member of the group and is thus not free from its ensuing forces."

3. What information regarding placement should clinics give to parents of little deaf children?

"The parents of these children should be given unbiased information concerning types of schooling and guides for choosing a school. A person well acquainted with the total education of the deaf should be represented on the advisory staff of any center making recommendations for schooling."

4. What part should a well-graded school for the deaf have in this preschool work?

"It is the responsibility of the well-graded school for the deaf to have the leadership in the education of the preschool deaf children. Such a school can plan and evaluate preschool education in light of the total education of the deaf child."

Our philosophy is that of any democratic public school in America. We are ready to help all who need what we have to offer, without personal feelings or glory.

All other organizations have a right to render their services, but it seems that in their desire to help the deaf and hard of hearing, they have, to some extent, excluded the possibility of pooling their ideas and maybe their facilities with other existing schools such as ours, in the best interest of the child.

Interrelationships Among Three Tests of Non-Language Intelligence Administered to the Deaf

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RECENT summaries of research in different areas of the psychology of the deaf point up the fact that considerable emphasis continues to be given to the differences between deaf and hearing in the various traits which have yielded to the psychologists' measuring sticks. When compared with the summary completed in 1940 for Pintner, Eisenson, and Stanton's *Psychology of the Physically Handicapped*, only limited shift in orientation is noted in a 1952 summary (Berlinsky*). The approach to the psychology is still in part an analysis of the differences between those with hearing losses and those without such losses.

However, within the field of the investigation of the psychology of the deaf itself, there is much which can be done. The dynamics of personality adjustment among those with losses in hearing, the evaluation of language instruction as an expressive and receptive medium and the prognosis of its success or failure, comparative investigations among the different methods of teaching speech, reading, language, and other school subjects, relations between non-language intelligence and scholastic success, and many other areas are yet not scrutinized by controlled study. The National Research Council developed an extensive list of areas for investigation some time ago and few answers are yet available in the professional literature.

Even within the field of the intelligence of the deaf— a field which first yielded to extended study among the hearing and which was the first area approached by the psychologists among the deaf— investigations are limited to the performance of the deaf on one or another of the various scales used to measure their mental capacity. The study is usually rounded off with a comparison of the

*See References for this and subsequent citations in parentheses.

performance of the deaf with that of hearing on the same scale.

The present report deals with a facet of the psychology of intelligence among the deaf. The interrelations of the performance of the deaf among three group tests of non-language intelligence are highlighted. Specifically, the report presents data on the relationships among the findings of the Chicago Non-Verbal Examination, the Pintner General Ability Tests, Non-Language Series, Intermediate Battery, and the Revised Beta Examination. Immediate questions are: What are the correlations between the scores on the Chicago and the Pintner, the Chicago and the Beta, and the Pintner and the Beta? What is the effect of the length of time between the administrations on the correlations?

Methodology

The records of a residential school for the deaf were used as a source of data. As a normal routine in the school, three group tests of non-language intelligence are administered the pupils to aid in educational and vocational planning. The order in which the tests are given is first the Chicago, then the Pintner, and last the Beta. Between the administrations of the first and last test in the series an interval of 6 or 7 years may lapse.

A random selection of 90 pupils was made from the records using the random number technique (Lindquist, page 24). In the group thus selected there was a total of 53 boys and 37 girls. The original group from which the sampling was made was composed of those children with hearing losses so severe that language and their school subjects had to be taught by special methods for the deaf.

The standard-score procedure was used to record the standings of the pupils on the Chicago (Brown, page 36). Because of the fact that the maximum mental age in the norms for the Chicago is 13 years 11 months, the modified standard score, defined as having "about the same meaning and (usable) in the same way as intelligence quotients" (Brown, page 36), was employed. The special norms for the deaf were used for the Pintner and the quotients calculated by the deviational method provided in the manual.

The Lindner-Gurvitz standardization of the Beta was used to obtain quotients on that scale. All tests were given in small groups and pantomime directions used throughout.

For each pupil in the sampling group, the intervals in terms of months of time between the administration of the Chicago and the Pintner, the Pintner and the Beta, and the Chicago and the Beta were calculated. Each of these three distributions of intervals was then arranged in increasing order. The median interval was obtained. This interval was used as a critical point to divide each distribution into two subgroups—those with a shorter interval between testings and those with a longer interval. Thus each subgroup is relatively more homogeneous with respect to age and the effects of an increase in time between administering the various tests can be studied.

Table 1 provides different aspects of background data for the sampled group: the average number of years and months between the dates each of the pairs of tests was given and the average age. The shortest average interval occurs between the Pintner and the Beta for those below the median interval; the average is 8 months. The results for those above the median interval for the Chicago-Beta pair represent those of the longest interval since the average interval is 6 years, 3 months. It is also important to keep in mind that the Chicago test was administered at a younger age than either of the other two tests; the Beta at an older age.

The Pearson product-moment method was used to obtain the correlation coefficients. Because of the possibility that chronological age may be a common factor and inflate the coefficients even in the relatively restricted age ranges represented in the groups of those above and below the median intervals, the final coefficients upon which the study is based are those obtained by the partial correlation technique. Actually, however, age was such a minor factor that the shift between obtained and partial coefficients was within .03.

The partial coefficients were evaluated on the basis that in the population of which the present group is a sample, the coefficients would be zero; i.e., the null hypothesis. The table provided by Lindquist (page 212) was used.

TABLE 1

AVERAGE TIME INTERVAL BETWEEN TESTINGS AND AVERAGE AGE AT TIME OF TESTING FOR CHICAGO-PINTNER, PINTNER-BETA, AND CHICAGO-BETA INTELLIGENCE TEST PAIRS ARRANGED BY BELOW- OR ABOVE-MEDIAN SUBGROUPS

Subgroup	Test Pair	Average Interval		Average Age	
		Years	Months	Years	Months
Below Median	Chicago-Pintner	1	7		
	Chicago			13	9
	Pintner			15	4
Above Median	Chicago-Pintner	4	10		
	Chicago			11	0
	Pintner			15	10
Below Median	Pintner-Beta	0	8		
	Pintner			16	4
	Beta			17	0
Above Median	Pintner-Beta	2	9		
	Pintner			14	9
	Beta			17	6
Below Median	Chicago-Beta	3	1		
	Chicago			14	0
	Beta			17	1
Above Median	Chicago-Beta	6	3		
	Chicago			11	0
	Beta			17	3

RESULTS

The partial correlation coefficients obtained for the various subgroups within each pair are presented in Table 2. These coefficients range from .58 to .69, all are positive, and all significant.

The coefficients for the correlation between the Chicago and the Pintner are .61 for the subgroup with a year and five months average interval between testings and .60 for the subgroup with four years, ten months average interval. An increase in interval between testings seems to have no effect on the coefficients between the Chicago and the Pintner tests.

The coefficients for the correlation between the Pintner and the Beta are somewhat higher, .67 and .69 for those below and above the median interval. Those below the median only had an eight-month average between testings while two years, nine months lapsed on the average between the testings for those above the median. Again an increase in interval between testings seems to have no effect on the coefficients.

The coefficients for the Chicago and the Beta are .65 for those with an average of three years, one month between testings and .59 for an average interval of six years, three months between testings. There is an apparent drop in correlation with an increase in interval between testings.

TABLE 2

PARTIAL CORRELATION COEFFICIENTS OF RESULTS ON THE CHICAGO AND PINTNER, THE PINTNER AND BETA, AND THE CHICAGO AND BETA INTELLIGENCE TEST PAIRS FOR THE SUBGROUPS ABOVE AND BELOW THE MEDIAN INTERVAL BETWEEN TESTINGS

Subgroup	Test Pair	Partial Coefficient*	Probability
Below Median	Chicago-Pintner	.61	#
Above Median	Chicago-Pintner	.60	#
Below Median	Pintner-Beta	.67	#
Above Median	Pintner-Beta	.69	#
Below Median	Chicago-Beta	.65	#
Above Median	Chicago-Beta	.59	#

* Age was partialled out as a common factor.

\# The probability is, in each instance, less than 1 in 100 that the obtained partial coefficients could have arisen by chance in a population wherein the true coefficient is zero. The null hypothesis can be safely rejected on the basis of this probability. There is a positive and statistically significant correlation between the members of the various pairs.

DISCUSSION

First it is important to point out that the various traits or constellations of traits measured by the three scales, the range over which each subtest within each scale functions, the standardization groups, the procedures for obtaining the quotients or other composite numerical results, and other factors vary considerably from scale to scale. And yet coefficients of correlation ranging in the .60's were obtained between the tests for average intervals from test date to test date ranging from 8 months to over 6 years.

The results of the survey can be discussed in detail from two major approaches.

Validity

As a criterion of validity in testing, the results of one test may be correlated with those of another which is accepted as a criterion. Thus, for example, the manuals for a number of recent intelligence tests cite the correlations between the test in question and the Stanford Binet

or some other test accepted as a criterion of intelligence. If the two correlate highly, the coefficient is accepted as evidence of the validity of the test in question (Freeman, page 163).

In line with this technique, Brown reports coefficients ranging from .57 to .74 between the Chicago and the Otis and the Kuhlman-Anderson verbal scales with the age factor varying freely. With age constant (a more valid technique for wide ranges in age), the coefficient between the Chicago and the Kuhlman-Anderson mental ages for 157 children was .51 (Brown, page 3). It must be brought out quite clearly that this is a correlation between a non-verbal and verbal test of intelligence.

Pintner reports coefficients ranging from .63 to .66 (with age constant) between his non-verbal scale and his verbal scale (Pintner, page 3).

For the Beta a coefficient of .78 is cited between it and the 1916 mental ages for the Stanford-Binet for 521 cases referred for special testing (probably a restricted group mentally). And one of .71 for the relation between it and the Otis higher examination (Lindner-Gurvitz, page 11). Again it must be mentioned that these are correlations between non-verbal and verbal examinations.

Accepting these coefficients then and comparing them with those obtained in the present study, it will be noted that they are in general terms not far apart. Those obtained in the present study are higher than those cited for the Chicago, equivalent to those for the Pintner, and somewhat less than those for the Beta. It must be noted moreover that in no case was a non-verbal test used as a criterion test. Since the correlations obtained in the standardizing groups are accepted by the test authors as evidence of validity, the assumption can be made then that the three tests, when used with the deaf, are validly measuring a cluster of traits which have been designated by the test authors as non-verbal intelligence.*

*However as a final statement of validity in the area of the deaf other criteria must be incorporated in the analysis of test performance to relate it more closely with pragmatic needs.

Forecasting Efficiency

Using the coefficients again as a basis, the forecasting efficiency of the tests may be discussed. Correlation between the tests can be taken as a statement of the capacity to estimate, within a certain degree of probable error, standing on the second test when the standing of an individual on the first test is known. Because the Chicago, the Pintner, and the Beta are given at different times in the pupils' lives, it is now possible, with the correlations available, to estimate standing on the Pintner and the Beta from the obtained standing on the Chicago. The same estimation may be made from the Pintner to the Beta. Formulas for these estimations are available (Garrett, chapter X).

As a basis for general discussion of the estimation of results on the Pintner and the Beta from those known for the Chicago, the efficiency of the coefficients in the .60's may be cited. Because of the involved statistics it will suffice for present purposes to say that coefficients in the .60's are from 20 to 28% better than a random guess (Bingham, page 259). The efficiency of estimation is not very great because percentages of 50 and greater are accepted for reliability in testing.

It may appear contradictory to state that coefficients in the .60's are acceptable indices of the validity of the tests but to reject them as indications of prognostic value. However, from a pragmatic approach, psychologists have found that validity measures in intelligence testing, using correlations between a test that is being introduced and an accepted authoritative test as the basis, will range from the .50's to the .80's. However for tests to yield consistent results upon retesting or upon testing with an alternate form, coefficients should be higher, usually in the .90's.

The thought can be re-expressed: Although the test content used in these three scales, the standardization groups, the range of capacity measurable in the tests, and other factors are different, yet there is coherence in the results. But the degree of coherence is not sufficiently great to warrant the conclusion that the results from one scale can be used interchangeably with those of the other scale. This emphasizes that with non-verbal tests, just

as with verbal, there is no such thing as THE I.Q. There is a test result only in relation to the test given and for this reason psychologists always mention the name of the test when citing I.Q.'s.

Comparison with Other Studies

There are no studies with which the present data may be directly compared. However, there are some data which are related to the findings here and these data should be cited.

In 1930 A. W. Brown reported the correlation between the Pintner Non-Language Mental Test (a forerunner of the test used in the present study) and the Grace Arthur Point Performance Scale among the deaf. With age partialled out the coefficient was .61. This is within the range found in the present study.

In 1946 Pugh reported the coefficients for the deaf between a verbal intelligence test, the Otis Quick Scoring Mental Test, and the Pintner Patterson Performance Scale, the Arthur, the Chicago, and the Pintner test used in this study. The coefficients are respectively .22, .30, .32, and .43. These coefficients between verbal and non-verbal intelligence tests are of a much lower order than those found in the present study between non-verbal tests.*

Summary

The purpose of this study was to ascertain the degree of correlation among three group tests of non-verbal intelligence when applied to the deaf. The three tests used are the Chicago Non-verbal Examination, the Pintner General Ability Tests, Non-language Series, Intermediate Battery, and the Revised Beta Examination (Lindner-Gurvitz standardization). As a normal routine, the three tests are administered at different chronological ages to the pupils enrolled in the school from which the data were obtained. A random selection of 90 pupils was made from the records and the results on the three tests obtained for each of the 90 pupils.

* And, it should be pointed out, the coefficients between verbal and non-verbal intelligence scales among the deaf are far lower than they are among hearing children. Success in language grasp (which is a necessary condition for taking the Otis test) among the deaf is apparently more dependent upon factors other than intelligence than it is among the hearing.

The average age at which the Chicago was administered was twelve years, six months; for the Pintner, fifteen years, seven months; and for the Beta, seventeen years, two months.

For each pupil the interval between the administration of the Chicago and the Pintner, the Pintner and the Beta, and the Chicago and the Beta was calculated. Using the median interval in each pair as the critical interval, the 90 pupils were divided into two subgroups, those above and those below the median interval for each of the three pairs of tests.

In each subgroup, the correlation between pupil standings on the Chicago and the Pintner, the Pintner and the Beta, and the Chicago and the Beta was obtained. Age was partialled out of each coefficient but, because of the limited range of age for each subgroup, the partial coefficients only shifted a small amount, .03.

With the exception of the coefficient for those with the greater interval between administrations of the Chicago and the Beta, the coefficients ranged in the .60's. The exceptional coefficient was .58. All coefficients are statistically significant.

And with the exception of the same group cited above, increase in the interval between testings did not bring about a noteworthy shift in coefficients. The relations between the tests are relatively independent of the intervals between giving the tests for the age ranges studied.

Coefficients of such a degree are accepted as evidence of the validity of the test when validation is based on correlations between the test in question and a test accepted as authoritative. However, because the degree of forecasting efficiency is relatively low, it is not advisable to use interchangeably the results from one test to another.

The obtained coefficients between non-language "paper and pencil" tests compared favorably with those obtained between another non-language "paper and pencil" test and a performance type test. Coefficients between a language intelligence scale and non-language scales are of a considerably lower order.

Because this is one of the first studies in this field, there are many facets of the problem which have not been in-

vestigated. Subsequent work in this field might analyze the coefficients among the tests when there is no appreciable interval between testings. At different times in a child's life different clusters of intelligence traits may be in ascendency and this variation possibly attenuated the obtained coefficients. Another attenuating factor may be the variation in the rate of mental growth in a child's life, for the work of the developmental psychologists has shown the importance of variation in rate within one trait and among several. Subtest and item analysis may yield a composite result more valid and stable than that obtained on any one of the three scales used. Other scales may be incorporated to study their distribution of results. The performance type scale may be related to the "paper and pencil" variety of non-verbal scales used here. Another avenue which may be fruitful would be the study of verbal scales in an attempt to adapt them to the deaf. Scales may be evolved which would involve only a modicum of language so that they would be a measure of receptive language and intelligence superimposed on the language.

The basic aim should be the development of scales which would assess those capacities within the deaf child which enable him to learn language and through this means master the usual school subjects, symbolize problems, and think through tentative solutions so that resulting behavior may be designated as intelligent. For the deaf individual, as for the hearing, there is no real dichotomy in his behavior in adequately meeting school and after-school problems.

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A Vocational Aptitude Test Battery for the Deaf

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Purpose:

Adolescent boys at the Minnesota School for the Deaf, Faribault, Minnesota, were given a battery of seven industrial vocational tests to determine whether or not success in the school's vocational shops could be predicted on the basis of test performance, and whether or not the deaf compared favorably with the normal hearing population on test performance.

Procedure:

Seventy-four males between the ages of 12 and 21 years were selected for this study. This constituted a 100% sample of all boys in the vocational shops. Two of these were American Indians and seventy-two were whites. The mean age of the total sample was found to be 16.61 years with a standard deviation of 1.87 years. There was no statistically significant difference between the test performances of those under sixteen years as compared with those over sixteen years of age. The mean I.Q. of the total group was found to be 96.51 with a standard deviation of 14.95 I.Q. points. Thus, in general intelligence our sample is neither practically nor significantly different from the total population of deaf children in state schools for the deaf in the United States. With the exception of three students, all those included in this study have been at the Minnesota School for the Deaf for more than a year. Two of the three exceptions came from day schools for the deaf and the other subject from a public school at the beginning of the 1951 school term. The degree of deafness ranged from slightly hard of hearing to total deafness.

Seven tests of the Factored Aptitude Series (1) were selected because of the interesting format, the variety of abilities sampled, the pictorial nature of most of them, and the conveniently short testing time. The test battery was comprised of the following:

1. Numbers—testing speed and accuracy in addition, subtraction, multiplication, and division.
2. Dimension—measuring ability to pick out rotated figures shown in reverse.
3. Blocks—tests ability to count blocks in piles and visualize the correct number of hidden blocks.
4. Perception—ability to scan names and numbers accurately.
5. Precision—ability to scan and locate pictures which are identical with each other.
6. Parts—ability to visualize the arrangement of scattered parts to form completed geometric figures.
7. Tools—measuring knowledge of the use of various hand tools and pieces of apparatus.

The Numbers and Perception tests were the only tests of a language nature but were included in the battery because they do tend to discriminate between good and poor performers in several of the vocational shops as will be seen below.

The seventy-four boys were divided into groups not larger than ten in order to facilitate the giving of instructions and to make certain that time standards were rigidly adhered to. In order to avoid the fatigue of a protracted session of testing, the boys were given a five minute rest period after the administration of four of the seven tests. Average time for the complete battery ran to one hour and ten minutes. Time limits were set in the manual (2) as five minutes for each test, but these limits were extended to six minutes inasmuch as the subjects were requested to write the numbers of the correct responses on special sheets of paper in order to facilitate scoring and handling of the tests. The six minute time limit was determined by taking the proportionally greater length of time which was required to search and find the correct response on the test blank and then to write the number on the answer sheet as compared with the length of time it took the average student to mark his response directly on the test blank (i.e. average time to search, find, and write response on answer sheet was 20% longer, or one minute added to the usual five minute time limit.) The six minute limit seems close to the optimal in that only eleven subjects

finished before time was called on the total battery, and of these only two students attained perfect scores on one test (Tools). The other nine of these were probably working too rapidly, since it was found that they sacrificed accuracy for speed.

As far as could be ascertained, all subjects maintained a high degree of interest in the tests and did their best to sustain a high level of speed in answering test items. Accuracy as well as speed was stressed at the beginning of each test in the battery.

Results:

Relative performance of the deaf subjects as compared with the normal hearing population is given below in Table I:

TABLE I

	Deaf			*NORMAL HEARING*			
Test	*Mean Raw Score*	*Standard Deviation*	*SE of Mean*	*Mean Raw Score*	*Standard Deviation*	*SE of Mean*	*T Ratio*
Numbers	21.07	8.23	.96	35.0	8.4	.14	14.38*
Dimension	25.17	10.45	1.22	26.0	8.5	.17	.67
Blocks	13.05	5.88	.69	15.4	5.7	.17	3.30*
Perception	12.76	7.37	.86	24.6	6.6	.11	13.66*
Precision	31.24	10.77	1.26	32.0	8.2	.16	.59
Parts	30.80	7.84	.92	31.9	6.7	.19	1.41
Tools	33.00	9.08	1.06	30.6	5.7	.16	2.24#

*Significant beyond the .001 level of confidence.
#Significant beyond the .05 level of confidence.

Table I confirms previous studies (3,4) in that the deaf subjects were significantly below the normal hearing population on Numbers and Perception—both of which require good reading and language ability. These differences are practically as well as statistically significant. On the Blocks test, many of the students were seen to be counting on their fingers which is much more inefficient than rapid mental calculation and probably explains to some extent the significant difference found on this test.

It is of considerable interest to note that the deaf boys were higher on the Tools Test than the normal hearing population. This difference, although statistically significant, does not appear to be a practical one. Since shop works is an important, integral part of their course of study, tool discrimination probably would be slightly better than in the population at large.

Minimal cutting scores were established using teachers letter grade ratings as a criterion for judging each student's proficiency in vocational class. These cutting scores were arrived at by selecting the score on each test which would eliminate the maximum number of poor performers and the minimum number of good and average performers. For example: If a minimal cutting score of 31 or above is used on the Precision Test it would eliminate 4 of 4 poor printers, 1 of 8 average printers, and none of 7 good printers according to the teachers' letter grade ratings based on performance in the print shop. When the battery of all seven tests is used in each shop together with the I.Q. score as an eighth variable, the total discriminative value is sharpened considerably and had much the same effect as if one were to use the more complex and time consuming multiple correlation methods and regression equations.

In Table II below, there are represented the minimal scores which were established for each vocational class on each test:

TABLE II

Shop	Numbers	Dimension	Blocks	Perception	Precision	Parts	Tools	I.Q.	Students in Shop
Printing	15	28	16	?	31*	30	37	100	19
Woodwork	13	14	13	14	30	29	31*	87	25
Tailoring	12–25	30	?	16*	24	31*	32	84	18
Shoe and Wood	8	12	8	6	21	24	22	80	9
Bakery	5	11	5	6	27*	24	23	80	3

Discussion:

Table I, which was briefly discussed above, is of interest also for the variability one finds in the deaf students on this particular battery. They showed relatively poor performance in the counting of blocks and did very poorly on arithmetic calculations and on the perception of likenesses and differences of words and series of numbers. The students are aware of the superior language abilities and general intelligence, relatively speaking, of those who are allowed to select printing as their vocational course of study. It is very probable that the prestige factor is operating very strongly here.

Table II tends to confirm the impression that general intelligence is a strong requisite for creditable performance in the print shop. Further inspection of Table II also reveals an "I.Q. hierarchy" of sorts, for the pupils of relatively lower general ability tend to gravitate toward those skills requiring more manipulative and concrete behavior and less of the abstract-planning type of behavior.

One might have expected the Perception test would correlate highly with printing ability, but we find from Table II that it failed to discriminate at all between good and poor printers. Reasons for this are not difficult to find, for the mean score is very low and all students except four were below the average for the normal hearing population. A plot of the distribution of scores on this test also reveals that a very large majority of the students obtained between 7 and 19 items correct which would make it very difficult to select any but the very obvious high scorers and low scorers as possible candidates or rejects for the print shop.

A cursory inspection of Table II reveals an I.Q. hierarchy as well as a test hierarchy, with those students in the print shop being generally the highest in general intelligence as well as over-all test performance. A study of the degree of relationship between each test of the Factored Aptitude Series *vs.* I.Q. reveals the following product-moment correlation coefficients:

Numbers *vs.* I.Q. .51, Dimension *vs.* I.Q. .48, Blocks *vs.* I.Q. .50, Perception *vs.* I.Q. .32, Precision *vs.* I.Q. .18, Parts *vs.* I.Q. .32, and Tools *vs.* I.Q. .55.

All of the above correlation coefficients are significant and positive with Precision *vs.* I.Q. being barely within the limits allowed. Thus, there are indications that the Factored Aptitude Tests do tend to sample general intelligence despite any claims to the contrary.

The reader of this article is warned that this study is only suggestive and that tabulated data cannot be considered normative for the deaf population in general. Cross validation and follow-up studies of these students will be necessary.

Conclusions:

1. Students of the Minnesota School for the Deaf were given a battery of Vocational Apitude Tests on which they

compared favorably with the normal hearing population in ability to complete geometric figures, know the use of hand tools and apparatus, select identical pictures from a series of pictures, and the ability to pick out rotated figures shown in reverse.

2. These students were inferior in the ability to scan names and numbers accurately, count blocks, and compute simple arithmetic problems.

3. This study purports to show that the deaf and hard of hearing can be tested for Vocational Aptitudes with a test battery which is largely pictorial in nature. The Factored Aptitude Series might be used to good effect provided more normative data can be obtained on the deaf.

4. Tests of the Factored Aptitude Series do tend to correlate with general intelligence as measured by the Ontario School Ability Exam and the Chicago Non-verbal Test.

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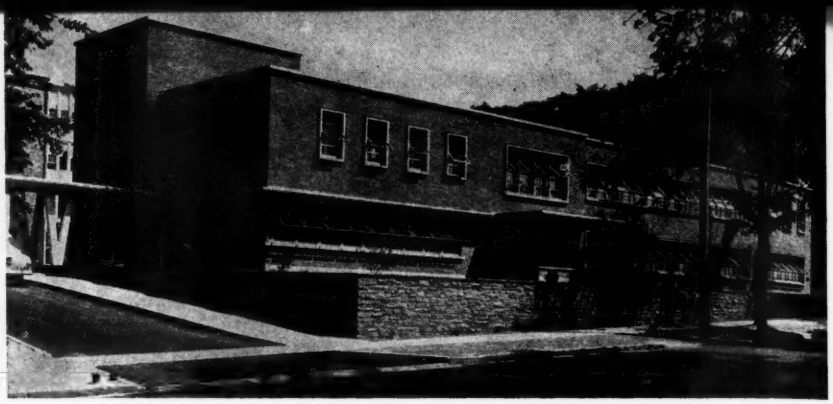

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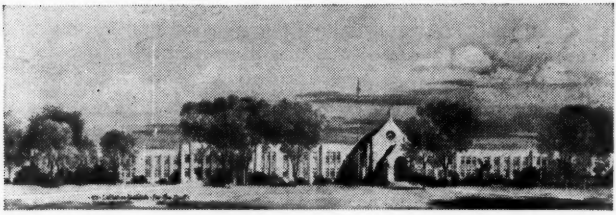

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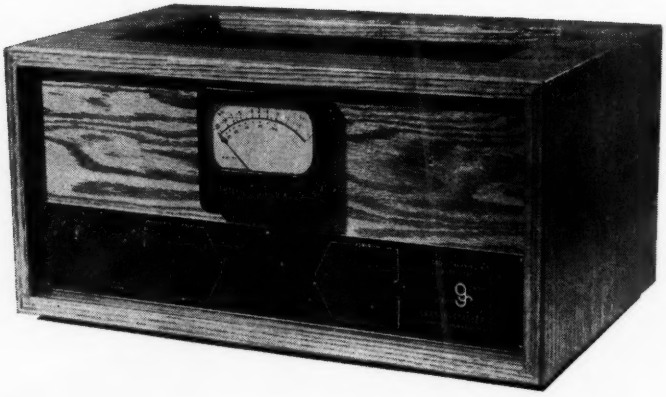

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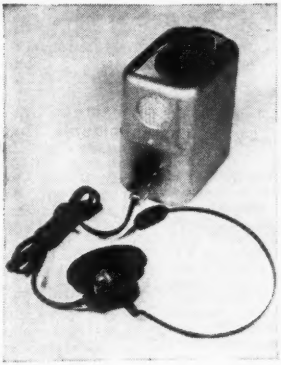

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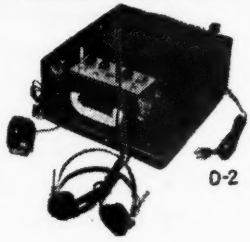

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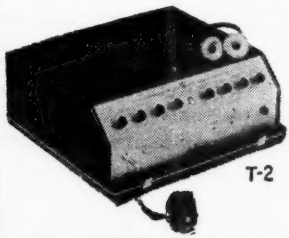

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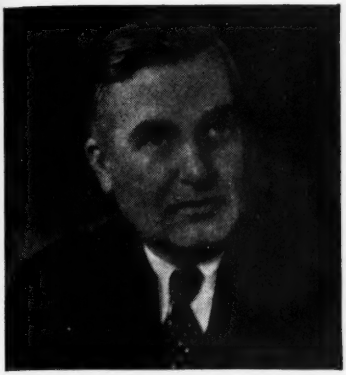

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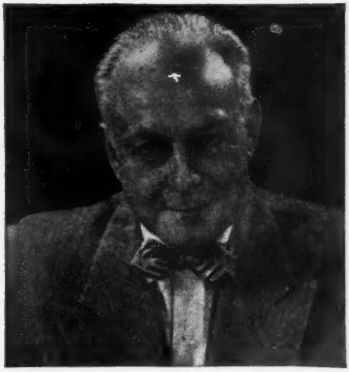

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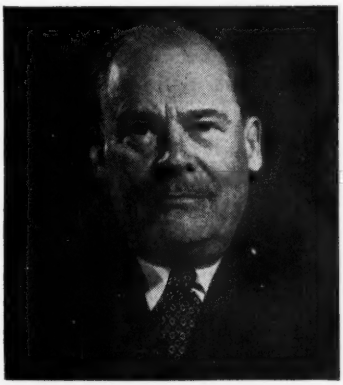

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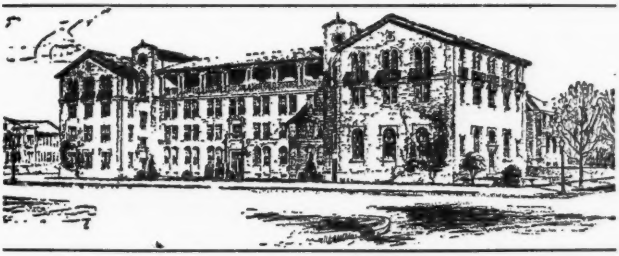

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The American Annals of the Deaf

The AMERICAN ANNALS OF THE DEAF was founded in 1847 at the American School for the Deaf in Hartford, Connecticut, by the members of the faculty of that school, which is the first free public school for the deaf in America. Although the journal received the approval of the administrative school authorities, the periodical was first entirely sponsored by the members of the faculty. After two years the ANNALS was discontinued for some months but was revived by the members of the Convention of American Instructors of the Deaf in their first meeting in New York, N. Y., in 1850.

In April, 1861, the publication ceased because of the War Between the States, inasmuch as the membership of the Convention was made up of northerners and southerners in almost equal proportion. In September, 1868, the AMERICAN ANNALS OF THE DEAF resumed publication with the editorial offices on Kendall Green, in Washington, D. C., where it has since remained.

The AMERICAN ANNALS OF THE DEAF is the official organ of the Conference of Executives of American Schools for the Deaf, which was organized in 1868, and of the Convention of American Instructors of the Deaf, founded in 1850. According to the Library of Congress it is the oldest educational publication in the United States still in existence. It is also the oldest journal on the education of the deaf in the world.

The ANNALS is published five times a year, being issued in September, November, January, March, and May. The subscription price is $4.00 a year, payable in advance. If five or more copies of the ANNALS are sent to one address, the subscription price is $3.50 a year. Single numbers sell for seventy-five cents, except for the January number which sells for $2.00. Back issues are available for 1847, 1848, 1849, 1857, and from September, 1868, to the present. Indexes for 1847–1875, 1876–1885, 1886–1895, 1896–1905, are available at $2.00 each. Indexes for 1906–1915, 1916–1925, 1926–1935, 1935–1945, were issued as regular numbers of the ANNALS. All back issues prior to 1930 sell for $1.00 each. All requests for subscriptions or for back numbers should be addressed to Editor, AMERICAN ANNALS OF THE DEAF, Gallaudet College, Washington 2, D. C.

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